

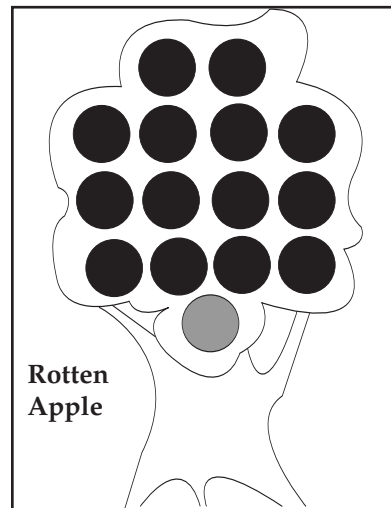
## Try This: Activity 1

# Two-Color Counters

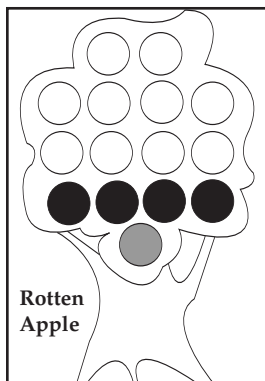
### Rotten Apple

This is a game for two players.

1. Place 14 red counters—the apples—on your game board. In the bottom row, place one yellow counter—the rotten apple.
2. Take turns removing one, two, or three apples.
3. The object of the game is to force your opponent to pick the rotten apple.
4. Play several games, then answer these questions.
  - Is it better to go first or second?
  - Did you find a way to always win? If so, describe it.



### Mathematical Potential



Discovering strategies for this game can provide a rich problem-solving experience. Once you figure out how to play and whether it is better to go first or second, you can always win.

Perhaps you've discovered that if you were left with five apples, as shown, you've already lost. In this case, whatever you took, your opponent could take the rest of the row, leaving you with just the yellow apple. You might also have realized that if you were left with nine apples, your opponent could win by removing the rest of the row and leaving you with five apples. In the same way, if you were left with thirteen apples, your opponent could leave you with nine, and then five apples. Thus, the challenge is to find a way to leave your opponent with thirteen, nine, or five apples, and not be left with them yourself.

This game can be changed in many ways. Start with a different number of apples (14 or 16, or more, or less). Remove a different number of counters on each turn (up to four or no more than two). Decide that the player who gets the yellow apples is the winner. What happens in each case?

### In the Classroom

Use the overhead projector to introduce the game to the entire class. Once you have explained the object of the game, ask a volunteer to play with you. As you play, you may encourage suggestions from those watching on the number of counters to remove. You might also want to model mathematical language by saying, for example, "There were 15 apples. I took 2 away. Now there are 13."

Give each pair of students a game board, 15 counters, and enough time to play a few games. Then, leave a copy of the activity, together with a game board and Two-Color Counters in a learning center. Encourage students over a period of weeks to play Rotten Apple and keep track of strategies they develop. Caution students not to reveal their winning strategies until there is a whole class discussion about their discoveries. Instead, invite those who think they have a winning strategy to challenge you to a game. This technique gives students feedback without taking the "Aha!" away from others.